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**IUID LARGE-SCALE FLEET DEMONSTRATION  
FINAL REPORT  
(REV 1)**

**United States Fleet Forces Command (USFF)**

**31 October 2009**

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## TABLE OF CONTENTS

<b>1</b>	<b>EXECUTIVE SUMMARY .....</b>	<b>5</b>
<b>2</b>	<b>OVERVIEW.....</b>	<b>6</b>
2.1	Scope of Demonstration.....	6
2.2	Demonstration Criteria .....	6
2.3	Demonstration Platform Selection.....	7
2.4	Demonstration Duration .....	7
<b>3</b>	<b>DEMONSTRATION BACKGROUND .....</b>	<b>7</b>
3.1	Preliminary Actions.....	7
3.2	Demonstration Process Steps.....	8
3.3	IUID Requirements.....	9
3.4	New Methodology.....	10
3.5	Demonstration Hardware and Software .....	11
<b>4</b>	<b>CONDUCT OF THE DEMONSTRATION .....</b>	<b>12</b>
4.1	Demonstration Limitations.....	15
<b>5</b>	<b>SHIPBOARD DEMONSTRATION RESULTS .....</b>	<b>16</b>
5.1	Demonstration Findings .....	16
5.2	Ease of Use.....	17
5.3	Training .....	17
<b>6</b>	<b>CONCLUSIONS.....</b>	<b>18</b>
<b>7</b>	<b>RECOMMENDATIONS.....</b>	<b>18</b>
	<b>SHIPBOARD EVALUATIONS (ENCLOSURE 1).....</b>	<b>21</b>
A.1	USS MASON (DDG 87).....	21
B.1	USS WHIDBEY ISLAND (LSD 41) .....	25
C.1	FORREST SHERMAN (DDG 98) .....	28
	<b>USS NIMITZ (CVN 68) OBSERVATIONS, (ENCLOSURE 2) .....</b>	<b>31</b>
	<b>SUMMARY OF SHIPBOARD FINDINGS (ENCLOSURE 3).....</b>	<b>33</b>

## TECHNICAL REFERENCES

- A. Acting Undersecretary of Defense (USD) (AT&L) Memorandum, Policy for Unique Identification (UID) of Tangible Items – New Equipment, Major Modifications, and Reprocurements of Equipment and Spares, July 29, 2003
- B. Acting USD (AT&L) Memorandum, Update to Policy for Unique Identification (UID) of Tangible Items – New Equipment, Major Modifications, and Reprocurements of Equipment and Spares, November 26, 2004
- C. Acting USD (AT&L) Memorandum, Revision of Update to Policy for Unique Identification (UID) of Tangible Items – New Equipment, Major Modifications, and Reprocurements of Equipment and Spares, December 22, 1994
- D. Acting USD (AT&L) Memorandum, Policy for Unique Identification (UID) of Tangible Personal Property Legacy Items in Inventory and Operational Use, Including Government Furnished Property (GFP), December 23, 2004
- E. USD (AT&L) Memorandum, Policy Update for Item Unique Identification of Tangible Personal Property, Including Government Property in the Possession of Contractors, 12 May 2005
- F. Department of Defense Standard Practice Identification Marking of U.S. Military Property, MIL-STD-130M, December 2005
- G. Office of the Principal Deputy Under Secretary of Defense (AT&L), Department of Defense Guide to Uniquely Identifying Items, Version 1.4, April 16, 2004
- H. Office of the Principal Deputy Under Secretary of Defense (AT&L), Department of Defense Guidelines for the Virtual Unique Item Identifier (UII), Version 1.0, December 29, 2004
- I. Office of the Principal Deputy Under Secretary of Defense (AT&L), Department of Defense Guidelines for Engineering, Manufacturing and Maintenance Documentation Requirements for Unique Identification (UID) Implementation, Version 1.0, December 6, 2004
- J. Department of Defense (DoD) Instruction 4151.19, Serialized Item Management (SIM) for Material Maintenance, December 2006
- K. Department of Defense (DOD) Instruction 8320.03, Unique Identification (UID) Standards for a Net-Centric Department of Defense March 23, 2007
- L. Guidelines for Registering Government Serialization, Type Designation and Ownership of Major End Items, Assemblies and Subassemblies and Capital Equipment in the IUID Registry Version 1.0 June 5, 2007
- M. Department of Defense Standard Practice, Identification Marking of U.S. Military Property, MIL-STD-130N
- N. USFF Generic Legacy Equipment IUID Demonstration Plan October 21, 2009

## **1 EXECUTIVE SUMMARY**

United States Fleet Forces Command (USFF) conducted a Large-Scale Shipboard Demonstration of its Item Unique Identification (IUID) shipboard solution as part its overall ship maintenance suite provided by the Maintenance Figure of Merit (MFOM) Fleet Family of Systems (FoS). The demonstration was conducted on twelve ships of various classes. The primary objective of the Large-Scale Fleet Demonstration was to validate that ship's force personnel could effectively use the IUID software and hardware to properly mark legacy equipment with an IUID label while performing daily maintenance activities and to successfully report the IUID information up to the National Registry.

The IUID software provided for this demonstration was part of the shipboard electronic tag-out program known as the Electronic Shift Operating Management System (eSOMS). The IUIDs for all of the ship's equipment was generated within the MFOM Model. The eSOMS equipment database for each participating ship was modified to include an additional data set that supports the identification of equipment IUID from the MFOM Model.

The MFOM IUID Demonstration has validated that the IUID implementation methodology was successful. Users experienced no difficulties in generating IUID tags. With the exception of the DYMO Label/Writer Twin Turbo printers there were no other hardware deficiencies reported during the demonstration. Based upon the observations of the USS NIMITZ (CVN 68), they found the printers to be of low quality and could not keep up with their printing demands. The MFOM Program Office will closely track the performance of the DYMO printer to ensure it will meet the Fleet's needs.

The Intermec CN3 handheld proved to be 100% effective in scanning and reading the shipboard generated IUID tags. All demonstration ships reported that users found the CN3 easy to use. Additionally, all ships in the demonstration reported that the IUID tags printed by the printer were clear and easy-to-read. They also reported that there were no problems in attaching the IUID tags to equipment. During the shipboard validation/evaluation assessment phase, the evaluation team found that 100% of IUID tags hung during the demonstration remained in place, were legible and when scanned by the CN3, displayed the correct information with no errors. Automatic reporting to the National IUID Registry was successfully demonstrated. No errors were reported when the assigned IUID were validated against the Registry.

The data results from the IUID Large-Scale Demonstration show that the criteria for success were achieved. With the exception of USS NIMITZ (CVN 68) all of the participating ships are continuing to generate IUID numbers, create and hang tags, and report IUIDs to the National Registry.

## **2 OVERVIEW**

This demonstration was designed to prove out a methodology for installation of IUID labels on maintenance-worthy, legacy equipment that required tag-out during the course of the demonstration. In addition to identifying and labeling the equipment, the demonstration was to validate the capability of the IUID software to upload the required IUID tag status information to the MFOM System as well as registering the IUID number in the National IUID Registry for validation of uniqueness. Labeling/tagging of equipment aboard ships was conducted by ship's force throughout the demonstration.

### **2.1 Scope of Demonstration**

United States Fleet Forces (USFF) and the Naval Sea Systems Command (NAVSEA) worked in unison to conduct the demonstration. The procedures used capitalized upon current maintenance practices and minimized the effort by ship's force in the accomplishment of the planned demonstration tasks.

One of the entering premises of this demonstration was that incorporation of IUID would assist future efforts to accurately identify and document shipboard equipment configuration. This would lead to improved accuracy of the MFOM model (model purification). It would also provide improved 2K quality and will decrease the time and resources required to identify and correct data entry errors in 2Ks. Maintenance planners would then be able to more effectively validate, screen, and broker the work to the appropriate repair activity based on the improved accuracy of 2K input. The utilization of IUID also provides a methodology to accurately track repairable equipment which is particularly important when repair activities move equipment off of a ship for repairs. In these cases, the IUID follows the equipment through the entire life cycle of the equipment. IUID aids in tracking the associated configuration data for the equipment including the appropriate deficiencies, upgrades and modifications throughout the equipment's lifecycle.

In the instance where equipment was clearly identifiable within the MFOM Model but, was not identifiable within the eSOMS equipment database, a procedure to correlate the two databases was adopted. When the data packets were sent to MFOM for processing, items identified within the MFOM Model that did not match equipment within the eSOMS equipment list were processed separately to link the appropriate MFOM equipment configuration information to the eSOMS equipment list. Subsequently, an alias was assigned that matched the eSOMS equipment list identifier for the equipment and was provided for incorporation into the MFOM Model and the eSOMS database. Both databases are capable of handling up to seven alias names for each unique piece of equipment as well as holding the designated nomenclature as the true identification name which matches what is listed in CDMD-OA.

### **2.2 Demonstration Criteria**

Success for this demonstration was determined by evaluating the outcomes of five key attributes:

- Minimal impact on ship's force as measured by end-of-demonstration interviews.
- Successful marking of the majority of the ship's maintenance-worthy, legacy equipment during the demonstration period with information provided by ship's force and the eSOMS data base.
- Successful registration of the data in the National IUID Registry to ensure the item's uniqueness.
- Successful update of the eSOMS, MRAS and MFOM databases reflecting incorporation of the new IUIDs as measured by a comparison of the databases.

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- Outcome criteria (Pass/fail) for this demonstration determined by attributes identified in Appendix C of the Legacy Equipment IUID Demonstration Plan, reference (n). The USFF evaluation team completed Appendix C in the Legacy Equipment IUID Demonstration Plan and checked a sample of the actual hanging IUID tags to verify durability and readability for each ship visit during the Demonstration Evaluation Phase.

### **2.3 Demonstration Platform Selection**

Ships from a variety of classes were selected to support this demonstration. The ship selection was based on nomination by the Type Commander, homeport and availability. The following ships were selected to participate in the demonstration:

- USS NIMITZ (CVN 68)
- USS HAWES (FFG 53)
- USS PONCE (LPD 15)
- USS MESA VERDE (LPD 19)
- USS RUSSELL (DDG 59)
- USS VELLA GULF (CG 72)
- USS FORREST SHERMAN (DDG 98)
- USS KEARSARGE (LHD 3)
- USS HURRICANE (PC3)
- USS WHIDBEY ISLAND (LSD 41)
- USS CHIEF (MCM 14)
- USS MASON (DDG 87)

Additionally, the USS NEW HAMPSHIRE (SSN 778) and USS TENNESSEE (SSBN 734)) were selected to participate in the demonstration. An issue surfaced with the Tagout Users Manual (TUM) and how the eSOMS software would be used to process IUID information on the tag sheet. As a result these ships did not participate in the demonstration.

### **2.4 Demonstration Duration**

The Large-Scale Demonstration commenced 01 February 2009 and concluded on 30 September 2009.

## **3 DEMONSTRATION BACKGROUND**

### **3.1 Preliminary Actions**

Many of the ships selected for this demonstration had previously been outfitted with eSOMS. A smaller set of selected demonstration ships required the installation of eSOMS. None of the ships had MFOM's Afloat Toolbox for Maintenance (ATM) installed with the MFOM FoS software.

Selection of equipment to be marked was through the use of equipment of opportunity. Equipment that was to actually undergo routine periodic or corrective maintenance and required a tag-out as part of a maintenance task automatically became a candidate for incorporation into the IUID Demonstration.

For all surface ship classes the determination regarding the number of CN3s to be provided was based on the fact that these ships use two tag-out logs identified simply as the Combat Systems tag-out log and the Engineering tag-out log. Consequently, each ship was provided two CN3

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scanners, associated support hardware, and user guides. Additionally, each ship was provided two printers set up to print both eSOMS and IUID tags.

The eSOMS equipment database was modified to contain an additional data set in order to support the IUID number as shown in Figure 1. Exact matches of equipment between the MFOM Model and eSOMS equipment databases resulted in an automatic entry into the eSOMS equipment database which is marked as the IUID number.

Each CN3 contained all the required software to conduct the demonstration. The CN3 was modified to contain third-party, IUID verification software as well as the ship model and Automated Work Notification (AWN) database. The verification software was used to compare the eSOMS with label plate data during the first and second person verification procedure.

Training was conducted for ship's force personnel by USFF eSOMS/IUID training teams. Training included over-the-shoulder training as well as webinar in briefs. This training was continually made available on an "as-needed" basis throughout the demonstration period.

Tags To Be Hung ENGINEERING DANGER TAGS Page 1 of 1

A02 [COR] AFT GALLEY STEAM KETTLE #5 11MAR09(00)

AG NO.	SYSTEM COMPONENT ID/ * LOCATION	TAGGED POSITION/ CONDITION	POSTED BY {INITIAL}	POSTING CHECKED BY {INITIAL}	IUID POSTED BY {INITIAL}	IUID POSTING CHECKED BY {INITIAL}	CLEARANCE POSITION/ CONDITION	CLEARANCE AUTHORIZED OFFICER {SIGNATURE}	CLEARANCE AUTHORIZED REPAIR ACTIVITY {SIGNATURE}	DATE/ TIME CLEARED	CLEARED BY {INITIAL}
24148	VLV SSTM 2-165-0 SPLY TO KETTLES *2-165-0-0	SHUT									
24149	VLV SSTM 2-165-0 RETURN TO KETTLES *2-165-0-0	SHUT									
24150	2CAD-V109 *03-74-4-0	SHUT			P	P					
24151	2CAD-V109 *03-74-4-0	IUID			P	P					
24152	AN/SPQ-98 *07-180-3-0	OFF			P	P					
24153	AN/SPQ-98 *07-180-3-0	IUID			P	P					
24154	BKR (01-240-2)-4P-B DB 01-238-1 VENT *01-240-2-1	OFF			P	P					
24155	BKR (01-240-2)-4P-B DB 01-238-1 VENT *01-240-2-1	IUID			P	P					
24156	BKR (01-56-8)-2SF-B EPOD PNL EQPT RM 1 *01-54-0-0	OFF			P	P					
24157	BKR (01-56-8)-2SF-B EPOD PNL EQPT RM 1 *01-54-0-0	IUID			P	P					

**Figure 1: IUID Tag Sheet Identification Field**

### 3.2 Demonstration Process Steps

For a maintenance action that required a tag-out, the eSOMS label tag was generated and printed as an IUID 2D barcode tag when the equipment was identified as being resident within the eSOMS equipment list and MFOM Model.

The maintenance technician who hung the eSOMS generated Danger and/or Caution tags also attached the printed IUID tags and recorded results in the eSOMS database. Once the IUID tags were in place, the maintenance technician scanned the IUID tag with a CN3 to verify that the information contained in the IUID tag was displayed correctly.

As a result of the Navy Integrated Application Product Server (NIAPS) software update being delayed, the ATM and AWN software was not in place for this demonstration. A work around



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was established by USFF to periodically download the eSOMS database from each demonstration ship and process the IUID information. The downloaded eSOMS database was placed on the ATM Ashore server from where the IUID data was then automatically up-lined to MFOM and the National IUID Registry. The National IUID Registry reported that 100% of the items submitted were indeed unique and were reported correctly. There were no duplicates and no unprocessed items

### **3.3 IUID Requirements**

References (a) and (b) delineate the mandatory implementation of Unique Identification (UID) on all solicitations issued on or after 01 January 2004. Reference (b), further states that this policy was mandatory for all government furnished property incorporated into an end item as of 01 January 2005. Reference (b) also instructs all program managers for new equipment, major modifications and re-procurement of equipment or spares to plan for the application of an IUID.

An IUID or a Department of Defense (DoD) recognized equivalent is required for all property items delivered to the Government meeting one of the following criteria:

- An acquisition that is valued at \$5000 or more
- An item that is serially managed, a mission essential or a controlled inventory piece of equipment or repairable item
- An item that is a component of a delivered item
- If the program manager has determined that a unique identification is required
- An IUID or a DoD recognized UID equivalent is available

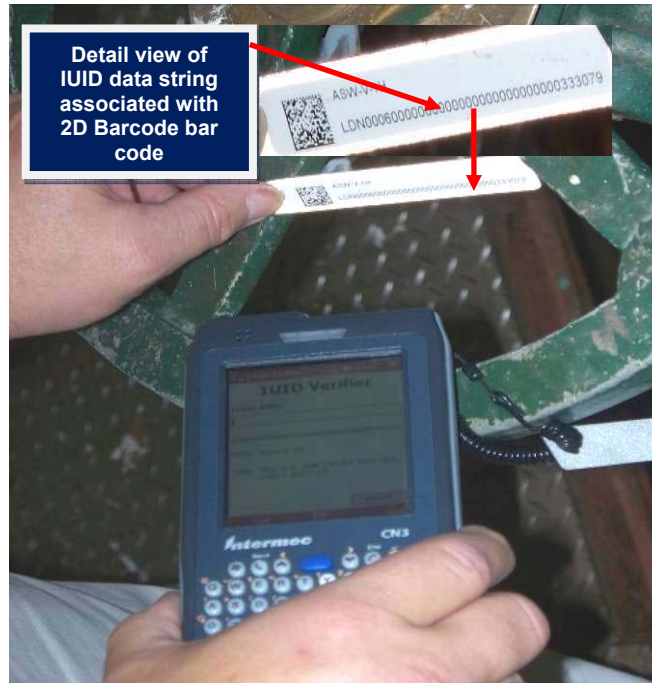
Reference (c) specifies that all plans should target FY 2007 as the point where existing serialized assets are to be entered into the IUID Registry and as the point where IUID marking capabilities were to be in place for existing items and embedded assets. Reference (c) also specifies a goal of 31 December 2010 for completion of IUID marking on existing and embedded assets. Reference (d) adds the requirement for IUID to be applied to legacy items as well as existing property items in inventory or in operational use.

The Office of the Secretary of Defense (OSD) defines the term Unique Item Identifier (UII) to describe a set of data elements marked on items that are globally unique and unambiguous in reference (e). Activities/Organizations are required to apply IUID labels or mark items that are serialized within DoD today or already have data plates. The full exploitation of IUID data is to be tied to emerging systems, business practices and procedures within the Navy and DoD. The IUID creates opportunities for information sharing across the Navy and DoD as it supports not only item accountability but, also asset visibility. The UID supports logistics and engineering data such as equipment/system age, reliability, condition, configuration, warranty information, and maintenance history. Further, the IUID offers a method to collect metrics that show the influence of equipment maintenance on readiness and equipment alterations as they relate to extended service life and Total Ownership Costs (TOC). References (f) through (m) provide further requirements, direction, and guidance for the implementation of the IUID.

This Large-Scale Fleet Demonstration of IUID capability was executed in accordance with the Legacy Equipment IUID Demonstration Plan, reference (n). Each of the Type Commanders (TYCOMs) participating in the demonstration provided prior approval of the demonstration plan via separate cover letters.

### 3.4 New Methodology

Implementation of the IUID process, which is integrated into the AWN software, significantly improves the quality of automated work notifications or 2Ks. Implementation reduces the time required to generate, validate, screen and broker work notifications. Procedurally, ship's force prints and attaches IUID labels during the process of tag-out isolation for maintenance. The IUID label contains a 2D Data Matrix symbol that provides the equipment configuration information and the IUID number as shown in Figure 2.

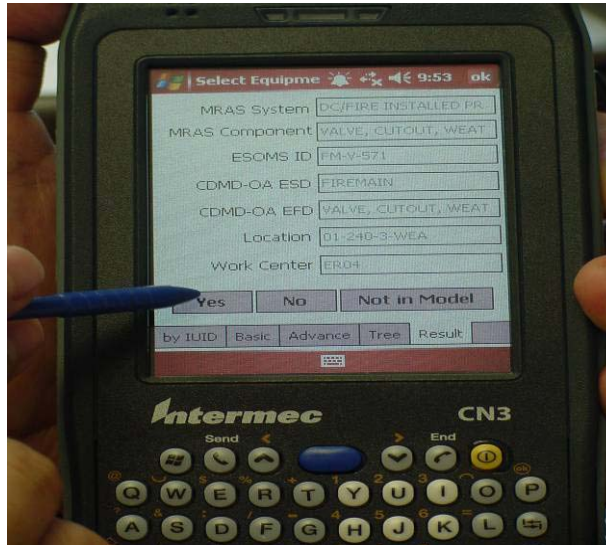


**Figure 2: 2D Data Matrix Configuration Data**

The maintenance technician attaches the label with either an adhesive cover or a cable tie at the same time the maintenance isolation tags are attached. The maintenance technician then scans the label with a CN3 to obtain the equipment identification information including selected logistics information.

The CN3 will transfer the equipment information directly into AWN which is the 2K generation application (Figure 3) and to the MFOM model data base. This eliminates the need to manually enter equipment configuration data. The transfer of actual equipment configuration increases the accuracy of the ship's MFOM Model and updates the status of equipment within the model.

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**Figure 3: Handheld AWN Interface View**

### 3.5 Demonstration Hardware and Software

During the demonstration the following was used:

#### HARDWARE

INTERMEC CN3 hand held scanner (Part Number AITIII-0006AA)

AEL 2-320026001 NIIN 1HS0099-LL-H70-0427

Both the Blue Tooth and Wireless radios were disabled

Winmobile 5.0

128MB ROM

128MB Flash

2.0 GB SD card (non-removable)

QWERTY keyboard

Docking/Comm station

14.8 hour battery

Area Imager

DYMO Corp Labelwriter Twin Turbo Model 93085 (Part number 69115)

AEL 2-320026001 NIIN 1HS0099-LL-H70-0428

300 dpi

Adhesive Tag Label Holder P/N U07530RB-A1

3/4" x 4" Self Stick tag with sticky back

.007" retro-reflective sheeting with enclosed optical lens elements outdoor

.003" UV filtering tedlar

.001" Permanent Acrylic adhesive

.007" Kraft silicone coated liner one side

Hanging Tab Label Holder P/N U07530RB

3/4" x 4" Hanging tag with hole

.015" base film clear polycarbonate self laminating covers

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.003" UV filtering tedlar  
.001" permanent acrylic adhesive  
.007" Kraft silicone coated liner one side  
DYMO Labels (White File Folders labels)  
DYMO P/N 30327  
9/16 by 3 7/16  
130 per roll, 260 per box  
Or SEIKO Labels (White File Folder Labels)  
SEIKO P/N SLP-FLW  
9/16 by 3 7/16  
130 per roll, 260 per box

#### SOFTWARE

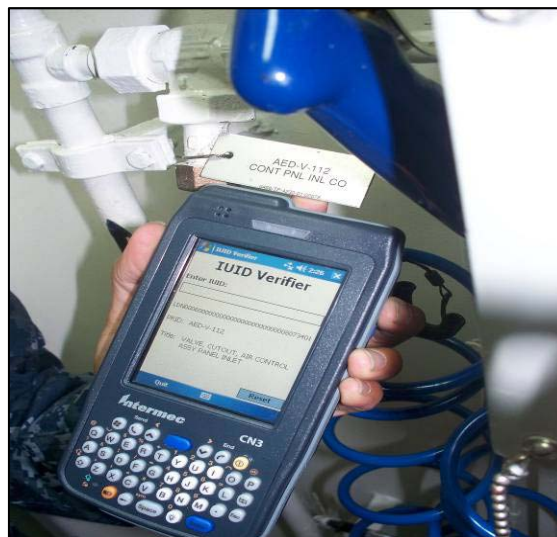
Shipboard Outside the ATM  
eSOMS ver 3.0.9 r2 with IUID modifications  
Shore-based acting as shipboard software inside the ATM  
ATM ver 1.1.8177U  
MRAS-U ver 11.1.8159U.S3.D10  
AWN ver 1.2.8.12  
Shore based software  
MFOM ver 2.3.7.11

#### **4 CONDUCT OF THE DEMONSTRATION**

The demonstration began by identifying equipment with an IUID match in the eSOMS equipment database that required tag-out prior to a maintenance action automatically had IUID tags printed in conjunction with the print routine for the normal eSOMS labels associated with equipment tag-out. If an IUID tag had not been previously attached to the equipment then the tag was printed for ship's force to attach. (Note: the system allows for the reprint of an IUID label on demand for replacement of lost or damaged IUID tags). Following the same process for hanging Danger and/or Caution tags, IUID tags were hung and verified by a first person and a second person verified the tag was hung on the correct component.

Once the IUID tag was hung and verified, the person posting the tags would subsequently use the CN3 to scan the IUID tag (Figure 4) and check the data elements displayed on the IUID scanner against the label plate data (Figure 5). The user validated that the data displayed on the CN3 matched the equipment's nameplate data. Since there was no MFOM software aboard the ships, the IUID data that would have normally been transmitted from the ship to MFOM (U) did not occur. Instead the data was held onboard the ship in the eSOMS database until the eSOMS database was copied and placed in the ATM Ashore application suite where it was then automatically transmitted to MFOM and on to the National Registry. Figure 6 shows the format of the data transmitted to the MFOM from the MFOM FoS software.

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### Figure 5: 2D Barcode Validation

```
<?xml version="1.0" ?>
<iuid_registry create_date="9/17/2009 2:54:42 PM">
  <iuid action="new" iuid="LDN00060000000000000000000000008074577" finKey="67364244" tag_hung_date="7/15/2009 12:03:30 PM" />
  <iuid action="new" iuid="LDN00060000000000000000000000008074583" finKey="67367416" tag_hung_date="7/15/2009 12:03:30 PM" />
  <iuid action="new" iuid="LDN00060000000000000000000000008074653" finKey="67370063" tag_hung_date="7/15/2009 12:03:30 PM" />
  <iuid action="new" iuid="LDN00060000000000000000000000008074765" finKey="67378739" tag_hung_date="7/15/2009 12:03:30 PM" />
  <iuid action="new" iuid="LDN00060000000000000000000000008078391" finKey="67679096" tag_hung_date="7/20/2009 2:10:36 PM" />
  <iuid action="new" iuid="LDN00060000000000000000000000008079370" finKey="67768416" tag_hung_date="7/20/2009 2:10:36 PM" />
  <iuid action="new" iuid="LDN00060000000000000000000000008079373" finKey="67768587" tag_hung_date="7/20/2009 2:10:36 PM" />
  <iuid action="new" iuid="LDN00060000000000000000000000008079460" finKey="67777425" tag_hung_date="7/20/2009 2:10:36 PM" />
  <iuid action="new" iuid="LDN00060000000000000000000000008079593" finKey="67791177" tag_hung_date="7/17/2009 10:18:24 AM" />
  <iuid action="new" iuid="LDN00060000000000000000000000008079809" finKey="67806482" tag_hung_date="7/17/2009 12:05:14 PM" />
  <iuid action="new" iuid="LDN00060000000000000000000000008079817" finKey="67807097" tag_hung_date="7/16/2009 4:49:04 PM" />
  <iuid action="new" iuid="LDN00060000000000000000000000008080290" finKey="67853065" tag_hung_date="7/20/2009 9:16:00 AM" />
  <iuid action="new" iuid="LDN00060000000000000000000000008080296" finKey="67853390" tag_hung_date="7/20/2009 9:16:14 AM" />
  <iuid action="new" iuid="LDN00060000000000000000000000008080496" finKey="67872606" tag_hung_date="7/20/2009 9:16:14 AM" />
  <iuid action="new" iuid="LDN00060000000000000000000000008080780" finKey="67890947" tag_hung_date="7/20/2009 11:05:26 AM" />
  <iuid action="new" iuid="LDN00060000000000000000000000008080783" finKey="67891371" tag_hung_date="7/20/2009 11:05:26 AM" />
  <iuid action="new" iuid="LDN00060000000000000000000000008080937" finKey="67900212" tag_hung_date="7/20/2009 11:05:09 AM" />
  <iuid action="new" iuid="LDN00060000000000000000000000008081288" finKey="67924015" tag_hung_date="7/15/2009 3:01:45 PM" />
  <iuid action="new" iuid="LDN00060000000000000000000000008081302" finKey="67924562" tag_hung_date="7/15/2009 3:01:45 PM" />
  <iuid action="new" iuid="LDN000600000000000000000000000080894626" finKey="69201420" tag_hung_date="7/17/2009 12:36:14 AM" />
  <iuid action="new" iuid="LDN000600000000000000000000000080895415" finKey="69259081" tag_hung_date="7/14/2009 2:36:51 PM" />
  <iuid action="new" iuid="LDN000600000000000000000000000080895473" finKey="69262724" tag_hung_date="7/17/2009 12:36:14 AM" />
  <iuid action="new" iuid="LDN000600000000000000000000000080895695" finKey="69278434" tag_hung_date="7/20/2009 10:00:13 AM" />
  <iuid action="new" iuid="LDN000600000000000000000000000080895705" finKey="69278750" tag_hung_date="7/20/2009 10:00:34 AM" />
  <iuid action="new" iuid="LDN000600000000000000000000000080895825" finKey="69288044" tag_hung_date="7/14/2009 2:36:51 PM" />
  <iuid action="new" iuid="LDN000600000000000000000000000080895830" finKey="69288463" tag_hung_date="7/20/2009 1:35:13 PM" />
  <iuid action="new" iuid="LDN000600000000000000000000000080895856" finKey="69290988" tag_hung_date="7/15/2009 10:20:53 AM" />
  <iuid action="new" iuid="LDN000600000000000000000000000080896432" finKey="69329238" tag_hung_date="7/20/2009 10:00:34 AM" />
  <iuid action="new" iuid="LDN000600000000000000000000000080896502" finKey="69333397" tag_hung_date="7/20/2009 10:00:13 AM" />
  <iuid action="new" iuid="LDN000600000000000000000000000080896307" finKey="69362047" tag_hung_date="7/20/2009 1:35:13 PM" />
  <iuid action="new" iuid="LDN000600000000000000000000000080897091" finKey="69375417" tag_hung_date="7/20/2009 10:00:13 AM" />
  <iuid action="new" iuid="LDN0006000000000000000000000000808101383" finKey="69845255" tag_hung_date="7/20/2009 1:35:13 PM" />
  <iuid action="new" iuid="LDN0006000000000000000000000000808104923" finKey="70401177" tag_hung_date="7/20/2009 9:16:00 AM" />
</iuid_registry>
```

**Figure 6: Data Packet Format Sent From ATM to MFOM (U) Ashore**

The data sent to MFOM (U) corresponds to the IUID tag hung on the equipment on the ship shown in Figure 7.





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Once the data package for a ship was received at the National IUID Registry, the data was processed to verify uniqueness and a results message was sent back to MFOM. Below is an excerpt of an XML data package that was sent back to MFOM. The example shows that the IUID information sent to the National IUID Registry was processed and accepted.

UIC: Identifies the ship sending IUID information to the National IUID Registry

UII: The actual IUID number being registered

Result: Registered. Verifies the IUID equipment was registered

RicNomenclature: noun name of what was registered

```
<?xml version="1.0" ?>
<MFOM_UIIVerificationResponse
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <UIC>21234</UIC>
  <ProcessDate>2009-09-28T10:54:22.5553697-07:00</ProcessDate>
  <ResultStatus>
    <Success>true</Success>
    <Message>Success</Message>
  </ResultStatus>
  <Verification>
    <UIIVerificationResult>
      <UII>LDN0006000000000000000000000000000000335208</UII>
      <Result>registered</Result>
      <ModelId>10619228</ModelId>
      <RicNomenclature>CIRCUIT BREAKER, (1-106-2)-1SF-D</RicNomenclature>
      <TagHungDate>2009-05-08T19:37:07</TagHungDate>
      <EquipSerialNumber>0000000000000000000000000000000000335208</EquipSerialNumber>
```

#### 4.1 Demonstration Limitations

Momentum to hang IUID tags on items was severely restricted since ship's force did not receive the expected benefits of their efforts. They had expected to use the MFOM FoS software to reduce the time to write maintenance deficiencies and more accurately report problems. The MFOM FoS software was not made available during the demonstration as had been expected due to NIAPS deployment issues. Since the software was unavailable, the end result was a low number of IUID tags being hung during the demonstration since the Sailors did perceive the direct benefits they expected by hanging the tags and that would have been available if the software was available. This was a circumstance beyond the control of the Fleet MFOM Team. The lack of the MFOM FoS software for this demonstration did reduce the sample size, but did not impact the findings documented in this report.

## 5 SHIPBOARD DEMONSTRATION RESULTS

### 5.1 Demonstration Findings

All ships participating in the demonstration were able to identify, mark and record IUID information for selected equipment as required and did not have to deviate from the demonstration plan. Enclosures 1 through 3 show ship specific findings which are summarized below:

- Some users attached IUID tags incorrectly, failed to use the approved IUID tag (size) and protective holder, or failed to hang tags in accordance with the procedure outlined in reference (n) Appendix G, paragraph 3.6.1.3.(a). For example, the valve shown in Figure 8 was marked with the incorrect label for the situation.



**Figure 8: IUID Tag Affixed to Valve Hand Wheel Using Wrong Type of Tag and Without a Protective Sleeve.**

- The Intermec Model CN3 hand-held scanner selected for the demonstration provided uninterrupted service and experienced no operational failures.
- The advertised specification criteria for the CN3 battery stated that it would last through an entire work-day, defined as 8 hours. There were no noted problems during the test period with the units meeting this criterion.
- 100% of 2D barcodes scanned were accepted as unique IUIDs by the National Registry.
- The CN3 demonstrated 100% accuracy in reading and displaying 2D barcode data when compared to the data found on the attached equipment data label plate.
- A total of 937 IUID 2D tags were hung. There were 3092 unique Danger and/or Caution tags hung during the demonstration that should have had an associated IUID tag hung at the same time. This equaled 30% of the identified equipment requiring tag-out being marked. Passing criteria was >40%. The percentage was evaluated as unsatisfactory and lower than expected due to the failure to provide the ATM software suite to aid in the proper selection of equipment nomenclature (alias) during the tagout process. Even without having the required full software suite, six of the ten ships participating in the demonstration achieved satisfactory results.



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USFF LARGE-SCALE IUID FLEET DEMONSTRATION FINAL REPORT

- All of the 2D barcode tags inspected during the shipboard demonstration evaluation were in place, readable and in good to excellent condition. No tags were painted over, torn, or displayed signs of wear.
- USS NIMITZ (CVN 68) crew noted that there was no place for the repair activity to sign on the tags to be hung sheet. It is MFOM policy to print a separate line item sheet to allow multiple repair activities to sign and document their repair actions.
- Early in the demonstration, the demonstration team noted on a few occasions that the IUID software generated an additional 2D barcode IUID tag when the software was used to produce safety tags for equipment that previously had an IUID tag generated as part of an initial tag-out event. This new 2D barcode IUID tag should not have been printed for previously processed equipment as part of a subsequent maintenance event requiring issuance of safety tags. The Fleet IUID Team corrected the software and updated all of the demonstration ships with the revised IUID software. No further occurrences of duplicate IUID tags were produced.
- Observations surrounding the printer are:
  - USS NIMITZ (CVN 68) experienced repetitive faults, specifically the printers were not always available and jammed when processing the IUID labels.
  - The unavailability of the printers on the network on the USS NIMITZ (CVN 68) turned out to be a network issue that involved all printers on the ship's network, not just the eSOMS tag printers.
  - Detailed comments from the USS NIMITZ (CVN 68) are provided in Enclosure (2).
  - Proved to be difficult to setup and jammed requiring considerable maintenance and troubleshooting time to restore.
  - Jamming issues are believed to have been caused by the adhesive at the end of the roll that transferred to the printer spooler.
  - USS MESA VERDE (LPD-19) also had some issues with printers jamming, but this was determined to be due to using the wrong size stock for the printer.
  - The IUID 2D printer used for this shipboard demonstration experienced some errors, but the overall reliability achieved was 90%.

## **5.2 Ease of Use**

- Shipboard interviews in USS MASON (DDG 87), USS WHIDBEY ISLAND (LSD 41) and USS FORREST SHERMAN (DDG 98) indicated that the CN3 scanner was easy to use and correctly read results.
- The most common complaint from the users was the time delay between when the maintenance person scanned an IUID tag and when the CN3 displayed the data. An average delay of 30 seconds was reported most frequently by users. This is considered a minor issue as the information once presented proved 100% correct.

## **5.3 Training**

- The training provided prior to the demonstration was reported as adequate by the ship's force in USS MASON (DDG 87), USS WHIDBEY ISLAND (LSD 41), and USS FORREST SHERMAN (DDG 98). The personnel on these three ships also reported that they did not experience any issues in using the CN3 or the printer. Additionally, they reported that there were no eSOMS training deficiencies.
- USS NIMITZ (CVN 68) reported that training received by shipboard personnel, prior to using the equipment, materials, and procedures for the demonstration, was evaluated as inadequate. This also was considered an anomaly as all other ships participating in the

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USFF LARGE-SCALE IUID FLEET DEMONSTRATION FINAL REPORT

demonstration indicated that the training they received was effective and useful. It should be noted that the training for USS NIMITZ (CVN 68) was provided prior to deployment and a significant percentage of those trained were transferred just prior to getting underway, leaving only a few of the originally trained personnel still available to complete the demonstration. The ship did not request follow-on training. In hind sight because they were focused on a successful deployment this may have not been the best platform to support the demonstration.

## **6 CONCLUSIONS**

The Legacy Equipment IUID Large-Scale Fleet Demonstration successfully proved the effectiveness and practicality of using the CN3 hand-held scanner to identify and scan specific equipment using the eSOMS equipment list and the unique MFOM Model.

The demonstration successfully proved the ability to identify equipment not contained in the eSOMS equipment database and subsequently transmit details to the NSWC Corona "not-in-model" team for resolution.

The demonstration successfully proved the durability of hanging or affixing IUID tag holders in a shipboard environment when used as a permanent marking method in Navy ships.

The demonstration successfully proved as part of the normal process to performing routine, daily maintenance tasks the Sailor can easily and effectively create, hang and verify the IUID tag information.

The demonstration successfully proved the process for up line reporting the IUID tag information to the National Registry and the return acknowledgement back to MFOM.

The proper IUID marking of equipment depends primarily on tagging equipment when the equipment is tagged-out for periodic or corrective maintenance. At a minimum, to completely mark all equipment in a ship may take a period of greater than 24 months. This is because many pieces of shipboard equipment have routine maintenance requirements set at intervals greater than one year.

## **7 RECOMMENDATIONS**

The 2D barcode IUID technology for marking equipment is ready for full implementation in the Fleet for use to mark maintenance-worthy, legacy equipment. Recommend USFF proceed with fielding the IUID software throughout the Fleet, if funding is made available to support Fleet implementation.

Fleet implementation of the IUID software will gain greater utility with the installation of the full ATM software suite onto the ship's NIAPS server. It is recommended that efforts to field the delayed NIAPS update containing the ATM software be aggressively pursued.

Additionally, the fielding of the Naval-Tactical Command Support System (NTCSS) Relational Supply (R-Supply) versions developed to communicate with AWN will further complete the utility of the IUID software as it will allow the maintenance technician to rapidly create a maintenance deficiency using AWN on the CN3 and then to order the needed parts directly from R-Supply via AWN. It is recommended USFF continue to pursue with SPAWAR and PMW-150 the fielding

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of the appropriate AWN/R-Supply software interface for all ships and associated commands.

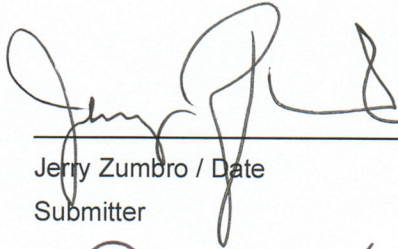
While the printer selected for the demonstration did not perform as expected on the USS NIMITZ (CVN 68), it performed well on the remaining ships participating in the demonstration. It is recommended that the MFOM Program Office continue to track the performance of the eSOMS tag printer to ensure it performs as required in the shipboard environment.

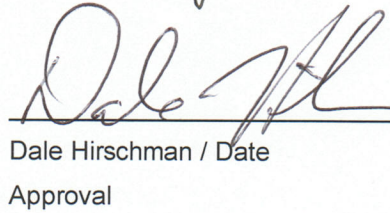
For the submarines, all equipment and materials are onboard both ships and all training has been performed to allow the ships to participate in the demonstration. Since neither ship could participate in the demonstration, USFF is prepared to run a trial period for both ships once the TUM issues have been resolved.

The potential for man-hour savings, improved maintenance history reporting and increased accuracy of maintenance data inputs is expected to be realized with the fielding of the AWN software. Through the implementation of IUID and the AWN application, the Fleet will realize both cost savings and cost avoidance via the following integrated capabilities:

- Provides more accurate data for the submission of Automated Work Notification (AWN/OPNAV 4790.2K) and greatly decreases the requirement to re-write 2Ks:  
Open Architecture Retrieval System (OARS) data base records indicate that of the 3366 jobs written per year for the average ship, 64% are in error. IUID/AWN pre-populates most of the associated fields in the 2K/AWN thereby greatly reducing the opportunity for error.
- Provides for a significant reduction in incorrectly ordered parts. Current OARS data indicates that approximately 5% of parts ordered for ship's force maintenance actions are incorrectly ordered due to use of a wrong Allowance Part List (APL) number.
- Provides an increase in the ability to track Depot-Level-Repairable (DLR) items or rotatable pool items.
- Provides for a significant decrease in ship's force man-hours required to generate AWN/OPNAV 4790.2K: Currently, the average time to generate a 2K is approximately 0.75 man-hrs. Use of IUID/AWN will decrease to < 0.10 man-hrs.
- Provides an increased accuracy of shipboard equipment configuration documentation: Currently, the Configuration Data Manager's Database Open Architecture (CDMD-OA) system's database is approx 60-70% accurate, which will be increased by 15% over the FYDP with IUID/AWN.
- Provides for the increased accuracy of the MFOM readiness reporting models (model purification). Improvement in accuracy with In-Service Engineer (ISE) configuration validation.
- USFF will seek to validate the automatic "Not-in-Model" functionality available in the MFOM FoS which will help to purify CDMD-OA.

UNCLASSIFIED  
USFF LARGE-SCALE IUID FLEET DEMONSTRATION FINAL REPORT

 1/14/2010  
\_\_\_\_\_  
Jerry Zumbro / Date  
Submitter

 14 JAN 2010  
\_\_\_\_\_  
Dale Hirschman / Date  
Approval

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USFF LARGE-SCALE IUID FLEET DEMONSTRATION FINAL REPORT

**SHIPBOARD EVALUATIONS (ENCLOSURE 1)**

**A. USS MASON (DDG 87)**

1. Number of 2D IUID tags inspected during ship visit: 48
2. Number of hanging Danger and/or Caution tags containing 2D barcode on the eSOMS label tag: 2
3. Number of 2D IUID tags inspected during ship visit requiring replacement: 0
4. Ship's company did not fill out Appendix D outlined in reference (n).
5. ESO interview produced following comments:
  - a) The hand-held IUID scanner was easy to use and did not present a problem or delay hanging Danger and/or Caution tags.
  - b) ESO commented that once all of the commonly tagged out equipment had IUID tags, he saw potentially benefit when used as the on the deck plate tool to initiate 2-Kilos, reducing errors he routinely finds when reviewing 2-Kilos for his Division and Department. Wanted to know when he will be getting ATM and AWN and more hand-held IUID scanners.

USS MASON (DDG 87)		IUID Demonstration Outcome Criteria			
Criteria		Actual	Pass	Fail	Comments
Evaluate the effectiveness of shipboard IUID labeling of legacy equipment during the performance of periodic maintenance and/or corrective maintenance tasks.	For the ESWBS / equipment or systems included in the demonstration, the goal is ship's force label 40% of the equipment meeting the IUID requirements.	179	P		68.5%
	Total # equipment identified to be tagged 261				
	Total # equipment tagged 179				

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USFF LARGE-SCALE IUID FLEET DEMONSTRATION FINAL REPORT

**USS MASON (DDG 87)**

**IUID Demonstration Outcome Criteria**

Criteria		Actual	Pass	Fail	Comments
	Percent = (tagged/to be tagged)x100%  Percent = (179/_261)x100%	68.5%	≥40%	≤40%	
	Labels applied and remain in place (Statistically sampling of designated areas of the ship to a confidence 80%)	100%	≥80%	<80%	
	Labels applied and require re-application	0%	≤20%	>20%	
	Labels printed for components that already have IUID Labels printed by the MRAS/eSOMS program	0%	≤10%	>10%	
Evaluate effectiveness of shipboard label printing of 2D Matrix UIIs. The number printed and reprinted will be obtained directly from the eSOMS database	Printers will correctly produce IUID labels 90% of the time.	100%	P		
	Number of labels printed	179			
	Number of label require reprint prior to hanging.	0	P		
	Percent	-	≤ 10%	≥ 11%	

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**USS MASON (DDG 87)**

**IUID Demonstration Outcome Criteria**

Criteria		Actual	Pass	Fail	Comments
Evaluate using the IUID scanner/imager and software to correctly identify and verify application of the IUID 2D Data Matrix symbol attached to legacy equipment in all shipboard environments.	The CN3 imager/scanners will correctly process the IUID data with < 10% errors	100%	P		
	Number of Scanner Errors	0	P		
	%Scanner errors/tags hung	-0	≤ 10%	≥10%	
	The CN3 imager/scanners will have a < 10% failure rate during the demonstration period	0	P		
	Total number of Scanners	2			
	Total number of Failed Scanners	0	P		
	% Failed	-	≤14%	≥ 15%	
	The CN3 will read the installed labels on equipment > 95% of the time when the label is properly installed	100%	P		

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USFF LARGE-SCALE IUID FLEET DEMONSTRATION FINAL REPORT

**USS MASON (DDG 87)**

**IUID Demonstration Outcome Criteria**

Criteria		Actual	Pass	Fail	Comments
	Number Produced	179			
	Number of attached unreadable tags	0	P		
	Percent Unreadable	0	$\leq 10\%$	$\geq 9\%$	
Export eSOMS Database	Able to export eSOMS equipment database showing IUID associations	100%	<u><math>\geq 90\%</math></u>		Demonstration ability to manually upline database for use off ship (simulates MFOM process)



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USFF LARGE-SCALE IUID FLEET DEMONSTRATION FINAL REPORT

**B. USS WHIDBEY ISLAND (LSD 41)**

1. Number of 2D IUID tags inspected during ship visit: 32
2. Number of hanging Danger and/or Caution tags containing 2D barcode on the eSOMS label tag: 0
3. Number of 2D IUID tags inspected during ship visit requiring replacement: 0
4. Ship's company did not fill out Appendix D outlined in reference (n).
5. E division Officer commented, use of the hand-held IUID scanner presented no problems for user when used as part of their tag-out process.

**USS WHIDBEY ISLAND (LSD 41)**

**IUID Demonstration Outcome Criteria**

Criteria		Actual	Pass	Fail	Comments
Evaluate the effectiveness of shipboard IUID labeling of legacy equipment during the performance of periodic maintenance and/or corrective maintenance tasks.	For the ESWBS / equipment or systems included in the demonstration, the goal is ship's force label 40% of the equipment meeting the IUID requirements.	12%		<b>F</b>	
	Total # equipment identified to be tagged 987				
	Total # equipment tagged 120				
	Percent = (tagged/to be tagged)x100% Percent = (120/987)x100%	12%	≥40%	≤40%	
	Labels applied and remain in place (Statistically sampling of designated areas of the ship to a confidence 80%)	100%	≥80%	<80%	
	Labels applied and require re-application	0	≤20%	>20%	

UNCLASSIFIED  
USFF LARGE-SCALE IUID FLEET DEMONSTRATION FINAL REPORT

**USS WHIDBEY ISLAND (LSD 41)**

**IUID Demonstration Outcome Criteria**

Criteria		Actual	Pass	Fail	Comments
	Labels printed for components that already have IUID Labels printed by the MRAS/eSOMS program	0	≤10%	>10%	
Evaluate effectiveness of shipboard label printing of 2D Matrix UIIs. The number printed and reprinted will be obtained directly from the eSOMS database	Printers will correctly produce IUID labels 90% of the time.	100%	P		
	Number of labels printed	120	P		
	Number of label require reprint prior to hanging.	0	P		
	Percent		≤ 10%	≥ 11%	
Evaluate using the IUID scanner/imager and software to correctly identify and verify application of the IUID 2D Data Matrix symbol attached to legacy equipment in all shipboard environments.	The CN3 imager/scanners will correctly process the IUID data with < 10% errors		P		
	Number of Scanner Errors	0	P		
	%Scanner errors/tags hung	0	≤ 10%	≥10%	
	The CN3 imager/scanners will have a < 10% failure rate during the demonstration period		P		
	Total number of Scanners	2			NA
	Total number of Failed Scanners	0	P		

UNCLASSIFIED  
USFF LARGE-SCALE IUID FLEET DEMONSTRATION FINAL REPORT

**USS WHIDBEY ISLAND (LSD 41)**

**IUID Demonstration Outcome Criteria**

Criteria		Actual	Pass	Fail	Comments
	% Failed		<u>≤</u> 14%	<u>≥</u> 15%	
	The CN3 will read the installed labels on equipment > 95% of the time when the label is properly installed	100%	P		
	Number Produced	120			
	Number of attached unreadable tags	0	P		
	Percent Unreadable	0	<u>≤</u> 10%	<u>≥</u> 9%	
Export eSOMS Database	Able to export eSOMS equipment database showing IUID associations	100%	<u>&gt;90%</u>		

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USFF LARGE-SCALE IUID FLEET DEMONSTRATION FINAL REPORT

**C. FORREST SHERMAN (DDG 98)**

1. Number of 2D IUID tags inspected during ship visit: 29
2. Number of hanging Danger and/or Caution tags containing 2D barcode on the eSOMS label tag: 0
3. Number of 2D IUID tags inspected during ship visit requiring replacement: 0
4. Ship's company did not fill out Appendix D outlined in reference (n).
5. No comments to report from ship.

**USS FORREST SHERMAN (DDG 98)**

**IUID Demonstration Outcome Criteria**

Criteria		Actual	Pass	Fail	Comments
Evaluate the effectiveness of shipboard IUID labeling of legacy equipment during the performance of periodic maintenance and/or corrective maintenance tasks.	For the ESWBS / equipment or systems included in the demonstration, the goal is ship's force label 40% of the equipment meeting the IUID requirements.	72%	P		
	Total # equipment 319 identified to be tagged				
	Total # equipment tagged 231				
	Percent = (tagged/to be tagged)x100% Percent = (231/319 )x100%	72%	≥40%	≤40%	
	Labels applied and remain in place (Statistically sampling of designated areas of the ship to a confidence 80%)	100%	≥80%	<80%	
	Labels applied and require re-application	0	≤20%	>20%	

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USFF LARGE-SCALE IUID FLEET DEMONSTRATION FINAL REPORT

**USS FORREST SHERMAN (DDG 98)**

**IUID Demonstration Outcome Criteria**

Criteria		Actual	Pass	Fail	Comments
	Labels printed for components that already have IUID Labels printed by the MRAS/eSOMS program	0	≤10%	>10%	
Evaluate effectiveness of shipboard label printing of 2D Matrix UIIs. The number printed and reprinted will be obtained directly from the eSOMS database	Printers will correctly produce IUID labels 90% of the time.	100%	P		
	Number of labels printed	231	P		
	Number of label require reprint prior to hanging.	0	P		
	Percent		≤ 10%	≥ 11%	
Evaluate using the IUID scanner/imager and software to correctly identify and verify application of the IUID 2D Data Matrix symbol attached to legacy equipment in all shipboard environments.		100%	P		
	Number of Scanner Errors	0	P		
	%Scanner errors/tags hung	0	≤ 10%	≥10%	
	The CN3 imager/scanners will have a < 10% failure rate during the demonstration period	0%			
	Total number of Scanners	2			NA

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USFF LARGE-SCALE IUID FLEET DEMONSTRATION FINAL REPORT

**USS FORREST SHERMAN (DDG 98)**

**IUID Demonstration Outcome Criteria**

Criteria		Actual	Pass	Fail	Comments
	Total number of Failed Scanners	0	P		
	% Failed	0	$\leq 14\%$	$\geq 15\%$	
	The CN3 will read the installed labels on equipment > 95% of the time when the label is properly installed	100%	P		
	Number Produced	231	P		
	Number of attached unreadable tags	0	P		
	Percent Unreadable	0	$\leq 10\%$	$\geq 9\%$	
Export eSOMS Database	Able to export eSOMS equipment database showing IUID associations	100%	<u>&gt;90%</u>		Demonstration ability to manually upline database for use off ship (simulates MFOM process)

UNCLASSIFIED  
USFF LARGE-SCALE IUID FLEET DEMONSTRATION FINAL REPORT

**USS NIMITZ (CVN 68) OBSERVATIONS, (ENCLOSURE 2)**

USS NIMITZ (CVN 68) reported they had terminated participation in the demonstration based on upcoming deployment issues. The letter below describes the ship's findings.

From: Commanding Officer, USS NIMITZ (CVN 68)  
To: Mr. Ron Lacosta, COMNAVAIRFOR N434A7

Subj: STATUS REPORT OF ITEM UNIQUE IDENTIFICATION EQUIPMENT  
DEMONSTRATION

Ref (a) COMNAVAIRFOR IUID/MID Demonstration Plan Document dated 3/24/09

1. Overview. NIMITZ was unable to validate the precept of the IUID/MID demonstration. The results of the demonstration fell short of desired objectives. Multiple elements contributed to the substandard demonstration results. The concept of implementing new programs on an initial demonstration platform were vindicated by this demonstration. A unilateral implementation plan upon all CVN platforms would have been cumbersome, ineffective and inefficient.
2. Recommendation. Early termination of subject demonstration. The objectives of the demonstration are not being achieved and further evaluation will be unproductive.
3. Summary of demonstration results and observations:
  - a. The training received by shipboard personnel, to use the equipment, materials and procedures for the demonstration, is evaluated as ineffective. NIMITZ lacked the resources to adequately administer this program. This project requires a full time, dedicated embarked staff. The outcome criteria of the reference (a) Appendix C and D were not tracked or maintained by shipboard personnel. General comments and problems were noted by demonstration team members, but specific records of events were not tabulated. At the conclusion of the demonstration, only 125 IUID labels were attached ship wide, and an estimated 400 man-hours expended.
  - b. The functional requirement to print IUID/MID tags is evaluated as inadequate. Shipboard printers were plagued by repetitive faults and jams induced when processing the IUID labels.
  - c. The demonstration plan objective, to ensure IUID/MID scanners/imagers operate without interfering with any other systems aboard ship, is evaluated as inconclusive. No dedicated effort was made to establish baseline criteria or demonstration procedures to measure this objective.
  - d. The overall measurement of success for the demonstration is evaluated as unsatisfactory. The equipment and process were cumbersome to shipboard personnel. It is probable that the method of application for this demonstration results in duplication of labeling. This would require remarking or revalidation of the component, and makes validity of the process suspect.
  - e. The precept of the demonstration appears to be fundamentally flawed, in that equipment nomenclature for components utilizes the existing eSOMS database. This database is locally administered, and allows for components used for equipment tag-out procedures, to be assigned more than one component name. During the demonstration, it was noted that components previously labeled with an IUID/MIC, would be issued a new IUID/MIC label, when a subsequent equipment tag-out was being administered. It is probable that there are components on the ship, with more than one "unique" IUID/MIC label affixed.

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USFF LARGE-SCALE IUID FLEET DEMONSTRATION FINAL REPORT

- f. Compilation of the demonstration results for this report, revealed that the program is a distraction to personnel administering equipment safety tag-out procedures, and unnecessarily delays the execution of maintenance, to the detriment of overall ship's material condition. Good judgment dictates that the demonstration be stopped.

T. C. Johnson  
By direction



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USFF LARGE-SCALE IUID FLEET DEMONSTRATION FINAL REPORT

**SUMMARY OF SHIPBOARD FINDINGS (ENCLOSURE 3)**

Ship	Hull	IUID Tags Hung	IUID Tags Not Hung	Total IUID Candidates	% of Total IUID Candidates Tagged P= 40%
HAWES	FFG-53	127	125	252	50
PONCE	LPD-15	0	0	0	Not started
MESA VERDE	LPD-19	121	165	286	42
RUSSELL	DDG-59	0	0	0	Not Started
VELLA GULF	CG-72	6	22	28	21
FORREST SHERMAN	DDG-98	231	88	319	72
KEARSARGE	LHD-3	121	485	606	20
HURRICANE	PC-3	14	10	24	58
WHIDBEY ISLAND	LSD-41	120	987	1107	11
CHIEF	MCM-14	18	12	30	60
MASON	DDG-87	179	261	440	41
TOTAL	All	937	2155	3092	30